Bonnie,

I have reviewed the *Draft Problem Formulation for Ecological Risk Assessment at Operable Unit 3 Libby Asbestos Site* and have the following comments for your consideration. Several important aspects of the document are missing and it should be considered incomplete at present. Some of the missing sections will require completion of the analysis of Phase I samples but other sections including, the ecological effects evaluation (tox profile), the role and ecological importance of various receptor groups, receptor life history information and discussion of endpoint selection are apparently not finished. The problem formulation should provide and integrate several bits of information: the contaminant(s) fate and transport, ecotoxicity, ecological setting and exposure pathways in a way that the logic is apparent as to why ecological receptors and assessment and measurement endpoints were selected. This logic flow is not apparent in this document as it now stands. This is in part due to the missing sections described above but is also due to other problems described below.

Additionally, it is presumed that there are significant information gaps in several areas. The problem formulation should *begin* documenting what portions of the project are data rich, where data gaps can be bridged with defensible assumptions and where data is needed.

GENERAL COMMENTS

1) Ecological Setting - There needs to be a description of the ecological setting of the site including aquatic and terrestrial habitat types, sensitive habitats, t&e species, species of concern etc.

2) Section 4.0 – Preliminary Effects Assessment

Text for this section isn't completed but the introductory paragraph describes the literature search as being done to identify the effects of asbestos on ecological receptors and references Appendix A (labeled as Attachment A) as where the literature search results are detailed. Appendix A is a list of potential TRVs (or benchmarks) and basic study design details.

Presumably this section is part of a larger *toxicity profile* which will include, in addition to the effects data, information on exposure and basic description of asbestos toxicology. The details of the toxicity profile, coupled with chemical fate and transport and life history information of expected ecological receptors should provide the logic as to which receptors are at risk and which pathways are likely complete and important.

I just realized that as I have been reviewing this version of the Problem Formulation, this section has been updated in the version of the Problem Formulation posted on the FTP site. I scanned the toxicity profile and the comments above are still valid. It appears that the sole focus of the tox. profile was to identify potential TRVs. While this is important, data on exposure is critical and needs to be presented. Additionally, where appropriate a summary of the basic understanding of asbestos toxicology and factors that may influence selection of receptor, development of testable hypothesis, assessment and measurement endpoints etc. is necessary.

3) Section 5.1 – Contaminant Fate and Transport

This section needs to present available background information on the chemical nature of LA (adsorption, persistence, degradation, dissolution, electrostatic charge etc), amphiboles in general and differences between amphiboles and chrysotile.

PROVIDES LOGIC FOR CHOICE OF RECEPTORS

ESTABLISH THAT CHRYSOTILE DEGRADES FASTER THAN AMPHIBOLES

4) Section 5.4 – Selection of Representative Wildlife Species

This section should evaluate the expected sensitivity to the toxic effects of LA and the behaviors that would increase exposure for organisms that are likely to occupy on-site habitats. Because it is anticipated that the majority of our exposure and effects results for wildlife will come from field collected animals and not modeling, and because there is very little information about the toxicity of LA to wildlife, selection of appropriate, at-risk receptors is very important. Based on the nature of the potential toxicity associated with LA, the species selection "considerations" presented on page 16 are not adequately explained and appear to be largely applicable to ingestion exposures and not inhalation. It is agreed that ingestion *may* be an important or contributory route of exposure, but no information is presented that inhalation shouldn't be considered the route of exposure of most concern at this point. As stated above, the rationale for the selection of receptors based on the considerations presented on page 16 is not apparent in the text as received.

The table of Representative Wildlife Species presented on pages 16 and 17 present a single species as the representative species. Since the assessment will largely consist of field collected animals, consideration should be given to providing several representative species to accommodate field conditions. This may be more of a SAP issue but developing the "target species" earlier rather than later will give informed BTAG members more time to provide recommendations.

Considerations

Small body size – The text indicates that small body size species are preferentially selected because they receive higher doses. This is typically true because of the high caloric requirements many small bodied species have relative to their body weights. This assumes ingestion is the primary route of exposure. The time for the effects of asbestos to be manifested is unknown and longevity is typically shorter in small bodied species so it is unclear why small body size was used in this way as a selection criteria.

Feeding Guild – This section, as described, is not strictly a feeding guild but a feeding guild and food habits. I think both feeding guild and food habits should be considered in selection of an ecological receptor but should be considered separately and weighted appropriately. Since wild animals spend a considerable amount of time foraging for food, food habits (specifics of foraging techniques and potential associated exposure) will be an important selection consideration.

Occurrence in Lincoln Co MT – This is a **necessary requirement,** not a consideration for selection of wildlife receptors that will largely be assessed by evaluating field collected animals. I am concerned with this being listed as a "consideration", that we are not on the same page regarding the broader direction of the project.

Availability of Parameter Data – It is unclear why this is listed as one of the top 5 considerations for selection of wildlife species when, at this point, the majority of exposure and effects data will be obtained from animals collected in the field. While not ideal, allometric scaling can be used to fill this data need if it arises. Additionally, if ingestion is assumed to be of secondary importance to inhalation, parameter data for

ingestion (as described in the text) will be of little use. This should not be a major consideration for selection of wildlife receptors. Again, with this being listed as a consideration, I am concerned that we are not on the same page regarding the broader direction of the project.

This section appears to need a lot more development. Several important factors that come to mind, that do not appear to have been explicitly considered are: longevity, hibernation patterns, site fidelity (parent and offspring), migration and nesting habits. All these factors are likely to have a pronounced influence on the exposure and effect of asbestos on field collected organisms.

Section 6.0 - Last paragraph, specifically the 2nd to last sentence.
It is reasonable that the general management goal is "adequate" protection of assessment populations and the accompanying definitions and descriptions on page 17 are helpful. Some clarification or disclaimer is in order however. The 2nd to last sentence begs the question of "how many individuals can be affected before the population is at risk"? It implies that the ERA will, within a reasonable amount of time and at a reasonable cost, be able to provide a mortality rate below which adequate protection of a population is achieved. It is far more likely that we won't be able to assess the populations/communities of some receptors with confidence and will then, as routinely happens when assessing a site, rely on the assessment of individuals to make a risk determination without any formal extrapolation to population level effects. The language here needs clarify this for 2 reasons 1) to provide project manager(s) realistic expectations of the results of the ERA and 2) to not place an unachievable burden of proof on the determination of risk.

SPECIFIC COMMENTS
1) Section 1.0, 2nd paragraph, 2nd sentence
Typo:
Problem Formulation can be completed as part of a Screening Level Ecological Risk Assessment (USEPA, 1997) but is ~~primarily~~ a primary component of the baseline ecological risk assessment.

2) Section 1.0, 3rd paragraph, 2nd sentence
Suggested text change:
...(*including ~~ponds~~* **waterbodies**)...

3) Section 1.0, 3rd paragraph, 3rd sentence
Suggested text change:
Non-asbestos contaminants at Libby OU3 will be ~~addressed~~ **initially evaluated** *in a Screening Level ERA.*

4) Section 1.0, 3rd paragraph, 4th sentence
Suggested text change:

A Screening Level ERA could not be completed for asbestos as toxicity screening benchmarks were not ~~readily~~ available for any environmental media for ecological receptors (soil, sediment, air, water and/or biota).

5) Section 1.0, 4th paragraph, last sentence
Typo:
Change 2007 to 2008

6) Section 2.1, Figure 2-1
Have the boundaries for Figure 2-1 been clarified as discussed during the Oct meeting? It appears there is still a gap not encompassing the Kootenai at the Rainey Kootenai confluence.

7) Section 2.1-Climate, 2nd paragraph
Figure 2-3 should be updated with the most current available wind data. Are other weather data available from the Vermiculite Mountain met station? If so, please include for the year. Of particular interest would be a monthly breakout of precip., and humidity. Additionally, the last sentence of this paragraph needs to be updated to reflect that its winter.

8) Section 2.1
See general comment #1

9) Section 2.2 Problem Definition
It appears that this section has been lifted from the Phase I SAP without updating the text to reflect the subject matter of the Problem Formulation and the availability of Phase I data. Please modify the text.

10) Section 5.3, last bullet
The text for "?" designated pathways does not match the text on Figure 5-1. These should be identical to avoid confusion. Additionally, all pathways should be re-evaluated when Phase I data is available. The distribution of asbestos contamination may necessitate changing the priority of some pathways.

11) Section 5.4, Table
See general Comment #4. Factors used to choose representative wildlife receptors and subsequently the selected representative species, need to be re-considered. Additionally, large mammals, as discussed in the Oct 30-31, need to be included. It doesn't necessitate that they are sampled this coming summer, or ever, but at this point they are still on the table.

12) Section 6.0, last 2 bullets
Suggested Text: Bonnie, we may want to discuss.
Ensure that the individuals comprising the terrestrial mammal assessment population(s) and bird assessment population(s) are able to carry out biological functions that influence their ability to maintain themselves within the area of evaluation and enable

them to fully *contribute to the larger biological population. These biological functions include survival, growth and reproduction.*

A similar change is recommended for the last bullet.

13) Section 7.1-Hazard Quotients
It is my understanding that reliable benchmarks are unavailable for asbestos. Please provide text in this section to indicate this line of evidence will not be available unless a benchmark is developed.

14) Section 7.1-Site Specific Toxicity Tests
In addition to site-specific test it may be useful to conduct some laboratory based spiking studies. This section should be written more general to not limit tox testing to site specific or written to include site-specific and laboratory-based testing.

Tables
Table 7-1 needs to be renamed from Gilt Edge Mine Site to Libby Mine Site. Additionally, table needs to be formatted so text is not obscured in some cells.

Review of the Assessment and Measurement Endpoints presented in table 7-1 will be done when the Problem Formulation is complete.

Attachment A,B
This section and Attachment B is referred to as Appendices in the text. Please make these consistent. Additionally, has any attempt been made to contact the FS or FWP to refine the list of potential receptors taken from the web?